Detector system for a corpuscular beam apparatus and corpuscular beam apparatus with such a detector system

Publication number: DE10012314
Publication date: 2001-09-20
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Classification:
- International: ***G01N23/225; G21K1/08; G21K5/04; H01J37/05; H01J37/244; H01J37/28;*** **G01N23/22; G21K1/00; G21K5/04; H01J37/04; H01J37/244; H01J37/28;** (IPC1-7): H01J37/244; H01J37/28; H01J49/48
- European: H01J37/244
Application number: DE20001012314 20000314
Priority number(s): DE20001012314 20000314

Also published as:

EP1134772 (A1)
US7060978 (B2)
US2002011565 (A1)
JP2001319613 (A)

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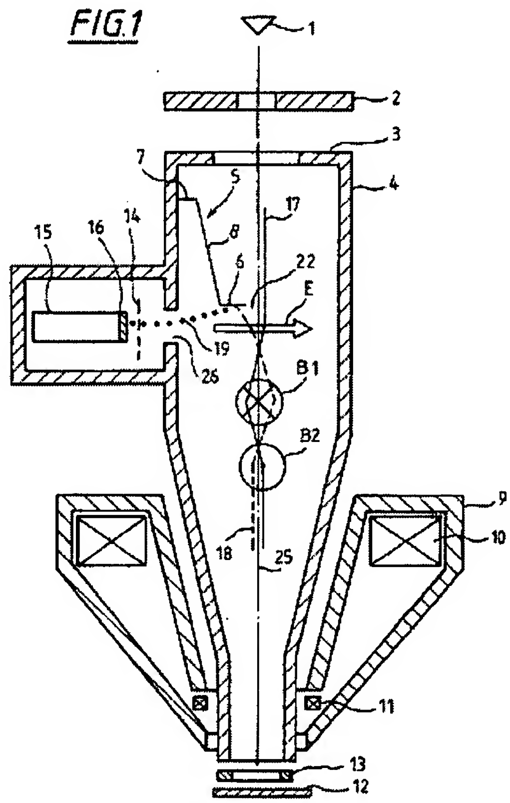
Abstract not available for DE10012314
Abstract of corresponding document: **EP1134772**

In the beam path is located a target structure (5) which comprises a central region (6) adjacent to opticacll axis (25) of the particle radiator and near to the axis. The central region is of a material strongly converting the electrons.The material is held at a region (7) away from the axis. The region, away from the axis, is in the form of a semi-circle, while the region near to the axis, is a strap connecting the ends of the semi-circle. The target is in the form of a shutter and the region, away from the axis, is of material weakly converting the electrons. Independent claims are included for the particle radiator.

FIG.1



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The available invention concerns a detector system for a Korpuskularstrahlgerät and a Korpuskularstrahlgerät with such a detector system.

In Korpuskularstrahlgeräten, as for example scanning electron microscopes, the task usually exists to detect for imaging the corpuscles emitted from an object by irradiation with a focused jet of primary corpuscles. The corpuscles emitted by the object can be divided in two groups, those at the object by dispersion scattered back corpuscles and the secondary corpuscles emitted by suggestion of the object by the primary corpuscle jet. The particles or corpuscles scattered back at the object exhibit thereby the energy of the primary corpuscles at the object almost, while the secondary corpuscles, for example the secondary electrons, exhibit a power spectrum broad related to their energy within the range of some eV clearly below the energy of the primary corpuscles. From the EP 0,661 727-A1 a scanning electron microscope with one is well-known ausserachsial in the path of rays arranged target structure. Further a magnetic and an electrostatic deflection field are intended in the path of rays, which work perpendicularly in each case to the Z-axis and it stands perpendicularly to each other and is so to each other excited in the sense of a vienna filter that the effect of the magnetic field and the electrostatic field on the initiating electron jet straight disappears. The backscattering electrons and secondary electrons spreading straight to the initiating electron jet in opposite direction are away-steered by this combination of magnetic and electrostatic field of the Z-axis of the electron microscope, so that they meet the target structure. Particles the hitting the target structure produce again tertiary particles, Konversionselektronen, which are proven in the following with the help of a scintillation detector.

In order to prove with this detection system only the scattered back electrons, a further perpendicularly to the Z-axis standing electrostatic field can be put on in direction of propagation of the secondary electrons before the overlaid magnetic and electrostatic field, by which it is to be prevented that the secondary electrons arrive at all at the Koversionselektrode. Perpendicularly to the Z-axis one can put on such a electrostatic field however without substantial influence of the primary jet even if the secondary electrons exhibit only an energy very small in relation to the energy of the primary jet within the range of this moving field. With scanning electron microscopes, with which the particles emitted by the sample are back-accelerated by an electrostatic lens into the jet guide tube of the electron microscope, how this is for example with the 28 476,4 systems the case described in the USA 4,831,266, the USA 4,926,054 and DE-A1 198, and also the secondary electrons due to this acceleration in the jet guide tube approximately the same energy is as the initiating electrons here to exhibit, a such suppression of the secondary electrons without substantial influence of the primary particle jet not possible.

In the USA 5,900,629, the USA 5,872,358 and the DE-A1 198 28 476 already mentioned is described further scanning electron microscopes with a conversion screen for the indirect proof of the secondary electrons and backscattering electrons. A separated proof of the secondary electrons and the scattered back electrons is not addressed in these writings however.

In the EP-A1 0,917,178 a further detector system for a scanning electron microscope is described. This detection system exhibits a screen, which is provided with a scintillation layer. The photons emitted by bombardment with scattered back electrons or secondary electrons of the scintillation layer are detected over a detector. Also with this system no separation of the signal is possible after secondary electrons and scattered back electrons.

In the EP-A1 0,917,177 a scanning electron microscope is described, which exhibits a consequence of magnetic, electrostatic and second magnetic deflection field for the spatial separation of the secondary electrons from the Primärteilchen. No separation is possible between from secondary electrons and the signals also produced by scattered back electrons here.

It is the goal of the available invention a detection system, in particular for a Korpuskularstrahlgerät of indicating with which the Sekundärteilchen emitted by an object or the particles scattered back at the object can be detected alternatively. The detection system is to be applicable also if itself the kinetic energies of the Primärteilchen,

which Sekundärteilchen and the scattered back particles at the place of detection differentiate only slightly from each other. This goal is achieved according to invention by detector systems with the characteristics of the requirement 1. Favourable arrangements of the invention arise as a result of the characteristics of the dependent requirements.

The detector system according to requirement 1 exhibits a target structure, which consists electrons in a central, axlenear range benachbaren to the Z-axis of the Korpuskularstrahlgerätes of a strongly converting material, which is taken up at a axle-far range.

The axle-far range can be in relation to the axlenear range further by the object beabstandet. Alternatively the axle-far range can be trained as half ring and axle near range as the ends of the half ring the connecting bar. Furthermore it is possible that the axle-far range consists electrons converting material of one only weakly.

The detector system according to invention preferably find application in combination with a deflection system from an electrostatic and a magnetic deflection field, whose field directions perpendicularly to each other and perpendicularly to the Z-axis of the Korpuskularstrahlgerätes. The two to each other senkrechten of deflection fields can be adjusted then so in each case to each other that the effects of both deflection fields on the primary jet waive themselves, at the same time however the particles scattered back emitted by the sample or of the Z-axis of the Korpuskularstrahlgerätes away to the target structure to steer. Then the conditions can be stopped by differently strong deflection fields in such a way that only the Sekundärteilchen hit on the electrons strongly converting axlenear range of the target structure. In this case the electrons scattered back at the object pass the target structure to a relatively weak excitation of the deflection fields because of their slightly higher energy within the range of the Z-axis. During a stronger excitation of the two deflection fields then also the particles scattered back at the object are diverted on the axlenear range of the target structure and hit these. During this stronger excitation of the deflection fields however the Sekundärteilchen are diverted already so strongly from the deflection fields that they hit either within the axle-far range out only weakly electrons converting material the target structure or hit within the axle-far range which is past further in relation to the axlenear range the target structure, and thus within ranges, within which either none are released tertiarily corpuscles, or this proof system serving in the sense case of particle of for the proof of the particles emitted by the target structure to be kept away. In all execution forms of the invention the separation between Sekundärteilchen and scattered back particles takes place via a strict spatial delimitation of the detection range of the target structure in a direction perpendicularly to the Z-axis of the Korpuskularstrahlgerätes. The dimensions of the central, axlenear range of the target structure on the one hand and the distance of the target structure from the Z-axis are selected in such a way with the fact that either only the Sekundärteilchen can hit or only the particles scattered back at the object the converting range of the target structure. Axle near range of the target structure is stegförmig trained with the narrow bar side to the direction of the electrostatic deflection field or as a narrow ring or cutout of a narrow ring parallel to it. The gate width or ring width is selected thereby according to the desired dissolution of energy.

With a favourable remark example of the invention the electrostatic deflection field and the magnetic deflection field are to each other transferred arranged toward the Z-axis of the Korpuskularstrahlgerätes.

With a further favourable remark example two magnetic deflection fields and an electrostatic deflection field are intended. By this combination of altogether three fields the deflection system can serve at the same time also for the adjustment of the primary particle jet on the Z-axis of the objective.

The electrostatic field and the magnetic field should be preferably independently adjustable, so that the necessary degree of freedom for an adjustment of the initiating electron jet is ensured relative to the Z-axis of the Korpuskularstrahlgerätes.

For the proof of the particles emitted by the target structure naturally a proof system is to be planned. This preferably is on a potential positive in relation to the target structure, so that the particles emitted by the target structure are accelerated in the direction of the proof system.

The proof system is preferably an electrode, for example a grid electrode or a Lochblende upstream. This electrode, which should be in relation to the target structure on a positive potential, can fulfill thereby a dual

function, serve i.e. on the one hand for sucking the particles off emitted by the target structure and serve at the same time for the production of the electrostatic deflection field.

Alternatively also a Lochblende at the potential of the target structure with a detector, which is opposite the target structure and the Lochblende on a positive potential, arranged behind it, is possible. The electrostatic field produced between the detector and the Lochblende seizes then by the Lochblende through and these reached through forms then the electrostatic deflection field, which serves at the same time also for sucking the particles off emitted by the target structure.

Since the Konversionselektronen with an energy small in relation to the primary jet withdraw from the target structure, an efficient exhaust of the Konversionselektronen is already ensured with a quite weak electrostatic suction field.

In the following details of the invention are more near described on the basis the remark examples represented in the figures. In detail show:

Fig. 1 the cut by a scanning electron microscope with a detector system according to invention,

Fig. 2 an increased Teilausschnitt of a scanning electron microscope with a detector system according to invention in accordance with Fig. 1,

Fig. 3 an increased Teilausschnitt of a scanning electron microscope with a detector system according to invention of a further remark example,

Fig. 4 the supervision on a blendenförmige target structure from strongly converting and weakly converting material, and

Fig. 5 the supervision on a target structure with stegförmigen electrons a converting range.

In the Fig. 1 represented scanning electron microscope has a structure, which corresponds to the scanning electron microscope in the DE-A1 198 28 476 in the principle. The particle beam producer consists particles of an emitting cathode (1), an extraction electrode (2) and an anode (3). If the Korpuskularstrahlgerät is designed as scanning electron microscope, preferably the cathode (1) is a thermal field emitter. From the cathode (1) withdrawing particles become by in the Fig. 1 not represented difference of potential between the cathode (1) and the anode (3) on the anode potential accelerates.!

The anode (3) forms at the same time the pour-lateral end of the jet guide tube (4). This jet guide tube (4) from electrically leading material is led by the drilling by the pole pieces (9) of a Magnetlinse with a circular solenoid coil (10), working as objective, and is trained at the object-lateral end as tubing electrode. The Strahführungsrohr a single electrode (13) is subordinate, which forms an electrostatic delay mechanism together with the tubing electrode of the jet guide tube. The tubing electrode is together with the entire jet guide tube on the anode potential, while the single electrode (13) and the sample (12) are on a potential lower in relation to the anode potential, so that the particles are braked after withdrawal from the jet guide tube on the desired lower energy. In the drilling of the pole piece (9) of the objective lens at height of the pole piece gap still another deflection system (11) is arranged, by which the initiating electron jet focused by the objective (9) on the sample (12) is diverted perpendicularly to the dash-dotted represented Z-axis (25) for scanning the sample (12).

Alternatively to the representation in Fig. 1 can end the jet guide tube (4) also on the height of the pole piece gap of the pole piece (9) and be arranged the deceleration electrode (13) also in approximately at height of the pole piece gap. The deceleration of the Primärteilchen on the desired Auftreffenergie takes place then already within the objective, so that the magnetic field of the objective lens and the electrostatic delay field overlay spatially. Between the anode (3) and the objective (9) a multiple deflection system is arranged within the jet guide tube, which consists further transversals of two serially one behind the other switched magnetic dipole fields (B1, B2) and an electrical field (E). The field directions both both magnetic dipole fields (B1, B2) and transversals the electrical dipole field (E) are all perpendicularly to the Z-axis (25) aligned, whereby again the field directions of

the two magnetic dipole fields (B1, B2) to the field direction of the electrostatic dipole field (E) is perpendicular. With in the Fig. 1 represented remark example are further the two magnetic dipole fields antiparallel to each other and sequence. The field strengths of all three dipole fields (B1, B2, E) are independently adjustable. The electrostatic dipole is pour-laterally the magnetic dipoles arranged thereby.

Between the anode (3) and the electrostatic dipole field (E) is further the detector system according to invention (5) arranged. This detector system essentially exhibits a target structure, which is on one side arranged by the Z-axis and essentially is on average z-shaped. The target structure (5) has one of the Z-axis (25) in radial direction removed range (7), at which the target structure is taken up within the jet guide tube (4). In an intermediate range (8) the target structure is designed as Konos piece, so that within this intermediate range (8) the planes of section of the target structure in a level containing the Z-axis run either parallel to the Z-axis or bent to the Z-axis, whereby the inclination is so selected that the distance of the target structure from the Z-axis (25) in direction of propagation of the initiating electron jet becomes smaller. At the end of the intermediate range (8) the target structure exhibits a distance (22) to the Z-axis (25) for depresses the initiating electrons. Further the target structure (5) exhibits a central range (6) from electrons converting material, neighbouring to the Z-axis (25), thus made of material, which emits Konversionslelektronen with bombardment with particles with relatively high efficiency. As materials for these electrons converting range metals with high ordinal number are applicable such as gold, copper and platinum. The surface within this range neighbouring to the Z-axis stands thereby perpendicularly to the Z-axis (25). The target structure is on the potential of the jet guide tube. The Konversionslektronen emitted by the target structure is provable over a suitable proof system. As proof system serves thereby with in Fig. 1 represented remark example a photomultiplier (15) with an upstream scintillator (16). The proof system is opposite the jet guide tube on a positive potential.

The distance between that the Z-axis (25) turned edge electrons of the converting range (6) of the target structure (5) and the Z-axis amounts to about 0.2-3 mm. The proof system (14, 15, 16) is arranged outside of the jet guide tube (4) behind a hole (26) by the wall of the jet guide tube (4).

The situation of the hole (26) is selected in such a way with the fact that the hole (26) is appropriate in direction of propagation of the secondary electrons and the backscattering electrons directly before the level electrons of the converting range (6), thus which falls pour-lateral edge of the hole (26) with the level electrons of the converting range together. The diameter of the hole and/or. its edge length amounts to thereby 2-8 mm.

Further the proof system exhibits an electrode (14), which is designed as hole electrode either as grid electrode or and is opposite the jet guide tube (4) on a positive potential. This electrode (14) forms thereby on the one hand an electrostatic suction field for the Konversionselektronen emitted by for electrons the converting range (6) of the target structure (5), and at the same time this electrode produces the electrostatic dipole field (E) together with the jet guide tube (4). The grid electrode (14) lies thereby between +10 V and +1000 V in relation to the jet guide tube (4) and the target structure (5). The scintillator (16) together with the photomultiplier (15) lie on +8 kV to +12 kV opposite the grid electrode (14). The dipole field formed between the grid electrode (14) and the jet guide tube (4) seizes thereby by the hole (26) of the jet guide tube (4) through, whereby it is reached that the electrostatic dipole field (E) is strongly located within the jet guide tube (4) and Konversionselektronen, which are produced in another place than within electrons the converting range (6), not to the proof system (15, 16) to be sucked off. The serial arrangement of the electrostatic dipole field (E) and the two further magnetic dipole fields (B1, B2) fulfill during the available arrangement a dual function: On the one hand these dipole fields serve for the separation of the secondary electrons and backscattering electrons emitted by the sample (12) from the initiating electron jet and at the same time serve these dipole fields around the initiating electron jet relative to the Z-axis (25), those by the Z-axis of the objective (9, 10) defined are to adjust. Initiating electron jet (17), an occurring the electrostatic dipole field (E), (in Fig. 1 as pulled through line represented) is first diverted in addition by the electrostatic dipole field (E), guided back from the first magnetic dipole field (B1) to the Z-axis (25), defined by the objective (9, 10), and returned direction-moderately in such a way by the second magnetic dipole field (B2) that the initiating electron jet runs after withdrawal from the second magnetic dipole field (B2) on the Z-axis (25) of the objective (9).

The secondary electrons released by bombardment with the Primärteilchen from the sample (12) and the initiating electrons (backscattering electrons), scattered back at the sample (12), become by the difference of potential

between the jet guide tube (4) and the electrode (13) into the jet guide tube (4) back-accelerates. Since with numerous applications both in biology and with semiconductor investigations the energy of the initiating electrons is in the range of the sample (12) substantially smaller as the energy of the initiating electrons within the jet guide tube (4), both the secondary electrons and the electrons scattered back at the sample (12) exhibit an energy, which almost corresponds to the energy of the initiating electrons within the jet guide tube (4). The energy of the backscattering electrons is still slightly higher thereby than the energy of the secondary electrons. With a difference of potential of for example 15 kV between the cathode (1) and the anode (3) and a difference of potential of 1 kV between the cathode (1) and the deceleration electrode (13) the initiating electrons have an energy of 16 within the jet guide tube (4) keV and between the withdrawal from the jet guide tube (4) and the deceleration electrode (13) on 1 keV are braked. The initiating electrons hit then with an energy of 1 keV the sample (12). The electrons experienced only a slight loss of energy scattered back at the sample (12) and become therefore between the deceleration electrode (13) and the reentry in the jet guide tube (4) on almost 16 keV accelerates. The secondary electrons withdrawing from the sample (12) exhibit opposite only a very small kinetic energy of few electronvolts, become then however between the deceleration electrode (13) and the reentry in the jet guide tube (4) on an energy of approximately 15 keV accelerates.

The further process of the secondary electrons within the jet guide tube (4) is in the Fig. 1 broken as course process (18) represented. The secondary electrons experience opposite direction of motion in the two magnetic dipole fields (B1, B2) due to their to the initiating electrons (17) a diverson, which is opposite to the respective diverson of the initiating electron jet (17). Since however the force direction of the electrostatic dipole field is independent (E) of the direction of motion and the secondary and backscattering electrons under inclination opposite to the primary jet occur the electrostatic dipole field, (E) a separation of the secondary electrons and the backscattering electrons takes place from the course process of the initiating electrons via the electrostatic dipole field. These running back electrons are diverted by the electrostatic dipole field (E) on the electrons converting range (6) of the target structure (5) and produce Konversionselektronen, which are sucked off from the grid electrode (14) and the potential produced by it to the proof system (15, 16). These Konversionselektronen are in the Fig. 1 dotted suggested and with the reference symbol (19) provide.

The separation between backscattering electrons and secondary electrons during the arrangement after Fig. 1 is on the basis the Fig. 2 more near describes. Are in the Fig. 2 the backscattering electrons as broken line (20) and the secondary electrons as dotted line (21) suggested. Due to their smaller kinetic energy the secondary electrons experience a stronger detour than the scattered back electrons (20) within the magnetic dipole fields (B1, B2). The effect of the electrostatic dipole field is that however identical on the scattered back electrons and the secondary electrons. Depending upon excitation of the two magnetic dipole fields therefore the detour, which the scattered back electrons (20) and the secondary electrons (21) experience, is different. During relatively strong excitation of the two magnetic dipole fields (B1, B2) it is reached that the scattered back electrons hit on the electrons converting range (6) of the target structure (5). Due to their stronger diverson that however the secondary electrons the electrons pass converting range (6) and meet within the peripheral range (7) the target structure (5). Since this peripheral range (7) is not converting electrons or, as far as nevertheless Konversionselektronen to the small extent arise, by which within this range existing electrostatic suction field do not reach the proof system, during this attitude of the magnetic dipole fields (B1, B2) excluding Konversionselektronen are proven, which were released by scattered back electrons.

During a weaker excitation of the magnetic dipole fields (B1 B2) and a weaker diverson of the secondary electrons and the backscattering electrons resulting from it it can be achieved that the secondary electrons (21) hit on the electrons converting range (6) of the target structure (5). Due to the weaker diverson of the scattered back electrons these pass then however the target structure within the axle-next range (22), so that in this case only Konversionselektronen are proven, which were released by secondary electrons.

In the Fig. 3 represented remark example differs from in the Fig. 1 represented remark example only within the represented range and corresponds otherwise to the remark example after Fig. 1. With this remark example on the one hand the sequence of the three dipole fields is exchanged, whereby with the remark example after Fig. 3 the electrostatic dipole field between the two magnetic dipole fields (B1, B2) is produced. The spatial situation of the electrostatic deflection field (E) regarding the situation of the target structure corresponds thereby the situation in the remark example after Fig. 1. Thus in direction of propagation of the initiating electron jet first magnetic dipole

field in direction of propagation of the initiating electron jet is seen before or on the height of the target structure (5). At the same time the two magnetic dipole fields are parallel to each other aligned with this remark example. The separation between secondary electrons and scattered back electrons takes place with this remark example completely similarly to the remark example described before. However the separation between secondary electrons and backscattering electrons is in relation to the remark example after Fig with this remark example. 1 and 2 strengthens clearly, since the energy-dependent detour is strengthened within the magnetic dipole fields due to the parallel adjustment of the two magnetic dipole fields (B1, B2).

As the further difference to the remark example after Fig. 1 is with the remark example after Fig. without the Gitterlelektrode (14) does to 3. The electrodes for the electrostatic deflection field become direct thereby by the scintillation detector (15, 16) and the external wall of the jet guide tube (4) in an educated manner and the field formed between these electrodes seizes again by the hole (26) of the jet guide tube through. This further difference is however not obligatorily linked with the changed order of the deflection fields. Rather it is also conceivablly, also with the order of the deflection fields according to the remark example after Fig. to plan 3 additionally a Gitterlelektrode between the scintillation detector (15, 16) and the hole by the jet guide tube to do or with the order of the deflection fields according to the remark example after figure (1) without the grid electrode (14). The moreover also still another additional electrode (27) can be favourable within the jet guide tube, which stands for the positive suction electrode regarding the Z-axis (25) opposite, with both execution forms. Such an additional electrode (27) is in Fig. 3 broken suggested.

With on the basis the Fig. 1-3 described remark examples is trained the conference structure (5) with a z-shaped cross section in each case. Thus within the peripheral range of the target structure beabstandeten by the Z-axis it is formed for case of electron which prevents that within the range (7) of the target structure (5), beabstandeten by the Z-axis, produced Konversionselektronen reach the proof system. So that an effective separation between the signals produced by the backscattering electrons and the signals produced by secondary electrons is possible, the distance should toward the Z-axis between the range beabstandeten by the Z-axis and the axlenear, electrons converting range (6) to be so largely selected that in the axle-far range (7) the electrostatic suction field is not still provable or hardly, so that within this range produced Konversionselektronen are not possibly proven. Depending upon geometry of the jet guide tube for it however distances of 1 mm are sufficient or more largely toward the Z-axis.

With in the Fig. that however the target structure is designed 4 represented remark example as screen (5) evenly. This screen (5) has the Blendenöffnung (22) in the center and to it in radial direction afterwards electrons a converting range (23), which consists electrons of a converting material. In the peripheral range (24) the screen (5) from a not converting material exists electrons. Since however in principle each material - although with different efficiencies - produces Konversionselektronen with the bombardment with high-energy electrons, only a worse separation of the signals produced by backscattering electrons is with a such even screen and the signals produced by secondary electrons possible.

In the Fig. 5 represented execution form for a target structure exhibits one as half ring (28) trained carrier, at which the target structure at the jet guide tube (5) is taken up. The two ends of the carrier (28) are by a bar (29) from electrons strongly converting material with one another groups. With this execution form only of the electrons or secondary electrons scattered back by the part Konversionselektronen are produced and proven, which hit the bar (29).

The width of the axlenear, electrons of converting range (6, 29) and its distance from the Z-axis (25) are to be laid out naturally as a function of the remaining construction parameters of the electron microscope and the desired dissolution of energy in such a manner that either only the secondary electrons or only the backscattering electrons, or only even in each case a selected part of it, which electrons converting range (6, 29) hit.

The detector system according to invention can be arranged also within a range of the electron microscope, in that a screen, for example a compression phase screen anyway is necessary. In this case the target structure can be trained as even or conical screen and transfer at the same time the function of a compression phase screen.

With on the basis the Fig. 1 and 3 represented remark examples as proof system consisting for the Konversionselektronen a scintillation detector is used of a photomultiplier with an upstream scintillation layer. It is however also possible to plan in place of the photomultiplier with upstream scintillation layer a full surface electrode. The proof of the Konversionselektronen can be made then simply by the electrode stream if necessary with suitable reinforcement.

With on the basis the figures described remark examples the electrostatic and the two magnetic dipole fields are arranged along the Z-axis transferred to each other in each case. For the separation of the secondary electrons and the backscattering electrons and the diverson both the secondary electrons and the backscattering electrons of the Z-axis however in principle a only one electrostatic dipole field and a only one magnetic dipole field are sufficient. These two fields can be each other overlaid also still in the sense of a vienna filter. However no more does not exist the possibility of adjusting the incident initiating electron jet relative to the Z-axis (9), defined by the objective (9), with this simplified execution form.

With on the basis the Fig. 1 and 3 described remark examples is the proof system behind a hole by jet guide tube (5) arranged in each case. Alternatively the jet guide tube can be also completely interrupted in this range, so that the jet guide tube consists of two partial pipes, which are toward the Z-axis (25) from each other beabstandet.

Claims:

1. Detector system for a Korpuskularstrahlgerät, in particular scanning electron microscope, with a target structure (5), arranged in the path of rays, whereby the target structure (5) exhibits a central axlenear range neighbouring to the Z-axis (25) of the Korpuskularstrahlgerätes (6, 23, 29) from electrons a strongly converting material, which is taken up at a axle-far range (7, 24, 28).

2. Detector system according to requirement 1, whereby the axle-far range (28) as half ring and axle near range (29) as the ends of the halfcircular axle-far range (28) the connecting bar are designed.

3. Detector system according to requirement 1, whereby the target structure (5) is designed as even screen and whereby the axle-far range (24) consists electrons of a weakly converting material.

4. Detector system according to requirement 1, whereby the axle-far range (7) is beabstandet in relation to the axlenear range toward the Z-axis (25).

5. Detector system after one of the requirements 1-4, whereby a proof system (14, 15, 16) is intended to the proof the range converting from that electrons (6, 23, 29) emitted Konversionselektronen.

6. Korpuskularstrahlgerät with a detector system after one of the requirements 1-5.

7. Korpuskularstrahlgerät according to requirement 6, whereby the detector system (5, 6, 7, 8) toward the corpuscles withdrawing from a preparation (12) a deflection system from an electrostatic deflection field is upstream (E) and a magnetic deflection field (B1, B2), whereby the electrostatic deflection field (E) and the magnetic deflection field (B1, B2) are perpendicularly to each other aligned.

8. Korpuskularstrahlgerät according to requirement 6, whereby the electrostatic deflection field (E) and the magnetic deflection field (B1, B2) are transferred to each other arranged toward the Z-axis (25) of the Korpuskularstrahlgerätes.

9. Korpuskularstrahlgerät according to requirement 8, whereby two magnetic deflection fields (B1, B2) and an electrostatic deflection field (E) are intended.

10. Korpuskularstrahlgerät after one of the requirements 6-9, whereby the proof system (14, 15, 16) is to electrons to the proof from that the range converting (6, 23, 29) of the target structure (5) emitted particles in relation to the target structure (5) on positive potential.

11. Korpuskularstrahlgerät according to requirement 10, whereby the proof system (14, 15, 16) exhibits an electrode, preferably a grid electrode (14) or a Lochblende.

12. Korpuskularstrahlgerät according to requirement 10 or 11, whereby the proof system (14, 15, 16) is arranged outside of the jet guide tube (4) behind a hole (26) by the wall of the jet guide tube (4) or in the range of an interruption of the jet guide tube (4).

13. Korpuskularstrahlgerät after one of the requirements 6-12, whereby the electrostatic field (E) and/the magnetic fields (B1, B2) are independently adjustable.

14. Korpuskularstrahlgerät after one of the requirements 6-13, whereby the target structure (5) is on the potential of the jet guide tube (4).